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## **Introduction**

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The importance of container transport as facilitator of international production and distribution networks is indisputable. However, new requirements from industry and authorities bring new challenges to transport operators and organisers.

Increasingly, especially in the aftermath of 9/11, container security issues put additional burden on the transport industry such as the necessity for securing logistics areas, certification of traders, electronic pre-notification of manifest data for advance risk analysis or the upcoming 9/11 Act of the USA requesting a 100% scanning of US-bound containers in the export port from 2012. Apart from the costs, these measures also reduce flexibility of transport chains so that, e.g., last minute container deliveries heading to the USA are not possible for any port anymore.

On the other hand, improved data availability is not only enhancing security checks but has also potential to improve the logistics, what we call 'supply chain visibility'. Improved predictability if containers move as planned leads to improved reliability of the total chain. If authorities (such as customs) and industry are sharing data in an efficient and trusted way, this may lead to benefits for both stakeholders: authorities can perform their security checks in a better and earlier way whereas the industry could benefit from incentives such as green lanes and pre-arrival clearance.

On the technology side, several trials with electronic seals and container security devices (CSDs) demonstrated that benefits are achievable – of course, if someone is willing to pay for these additional technologies. Drivers are the monitoring of high-value or high-risk goods transports or the expectation of a legislation which could make the use for such equipment mandatory but there are currently no signals that this will happen in the near future.

This special issue focuses on several methods and solutions for approaching the issue of security and visibility in container chains – tackling both technical and economical aspects. Vilko and Hallikas report about the impact of supply chain risks in Finland. Prokop has a technology focus on smart containers and the public goods approach for supply chain security. Wang, Pulat and Shen deal with a data management aspect in their paper on 'Data mining for the development of a global port-to-port freight movement database'. Economic questions are tackled by Scholz-Reiter, Haasis and Daschkovska investigating a cost-benefit model for a secure container network and Harder and Voß discussing a cost model for investment decisions on RFID. Finally, Arendt,

Meyer-Larsen, Müller and Veenstra (2010) in their paper on 'Practical approaches towards enhanced security and visibility in international intermodal container supply chains' report on the findings of the European R&D projects CHINOS and INTEGRITY.

Vilko and Hallikas report that cargo flows in the Gulf of Finland have grown substantially since the fall of the Soviet Union. The high growth of traffic density in the narrow and shallow shipping lanes has been the centre of attention for some time, and researchers have produced several reports warning about the risks involved. Many of these reports have not, however, considered the viewpoint of the practitioners of business life. Therefore, this paper is contributing to this gap by presenting the risks identified affecting the supply chains from their perspective. The study was conducted by interviewing organisations acting as part of a focal supply chain. The main risks identified by the interviewees were the port functions and the sea lanes and land routes near the port. The risks recognised varied significantly between the companies and persons depending on their position in the supply chain.

Harder and Voß deal with radio frequency identification (RFID) affiliated with an object for the purpose of identification and tracking using radio waves. While conceptual ideas and potential applications are widespread its use within maritime shipping still needs to be advanced. In fact, the shipping industry still seems to be hesitant regarding RFID investment decisions. This paper proposes a simple cost model, which is applicable for RFID investment decisions showing that under reasonable assumptions RFID may provide moderately quick ROI and discussing relevant factors to be used in business scenarios. In particular, the construction and the origin of these factors are explained, thus allowing an understanding that RFID usage may have real business impact in maritime shipping.

Prokop reviews the state of technology related to smart containers, discusses their role in the drive to securing global supply chains, and uses the economics of public goods to help explain the strategic decisions faced by government, shippers and carriers. The US Bureau of Customs and Border Protection has offered to give 'green lane' treatment to any smart container arriving at a US port of entry. Promised benefits would be no inspection and immediate release at the port. The problem is that there is no smart container currently in use; nor is the nature of a smart container yet agreed to by industry and government. The economics of public goods, as developed in this paper, help to clarify the role of the importer, the carrier, the foreign vendor and the US regulatory agencies. Essentially, the issue is how to manage the trade-off between efficient trade flows and security across international supply chains. It will be shown that some of these players have incentives to under-provide expenditures devoted to such security. But that creates a further opportunity for smart containers to mitigate that situation.

Wang, Pulat and Shen investigate the difficulty of integrating data from transportation data sources which is a challenge due to differences in matrices such as units, scales, data frequency and commodity codes. This paper proposes a three-step data mining model for freight transportation applications, with a special focus on how to set up a port-to-port containerised freight flow database between the USA and other countries. A data filtration step is proposed to select the relevant data sources from a set of original data sources and identify the most efficient subset of the selected relevant data sources. A data integration step implements some specific integration techniques to build a new database for a given freight transportation research. A data interaction step investigates data applications of the newly built database in a variety of application domains. The approach

is demonstrated establishing a database by studying the global containerised freight movement for the USA.

Scholz-Reiter, Haasis and Daschkovska state that the container industry has proved to be a remarkably efficient commercial system, designed to move goods through the international supply chain in the fastest way. The main drivers of the system are speed and low cost. The existing trend demonstrates the importance of development and implementation of new security detecting technology, like RFID e-seals in container transportation to achieve international secure and efficient global trade. In their paper, the authors propose a model for cost-benefit analysis to estimate potential costs and direct benefits through the implementation and use of RFID container electronic seals in global secure container networks.

Arendt, Meyer-Larsen, Müller and Veenstra base their paper on the assumption that the participants in international container supply chains require better transparency for their shipments. In addition, security requirements rose after 9/11. Checks are primarily performed by customs authorities having the facilitation of global trade as a crucial element of their mission as well. The paper demonstrates a practical approach based on the experience obtained from two EU-funded research projects: INTEGRITY and CHINOS. Both projects intend to make door-to-door transport chains more secure and visible. CHINOS is dealing with optimisation of visibility and security, and uses innovative IT technology like RFID and automatic damage documentation in order to support transport and terminal operators. INTEGRITY develops an IT system serving both issues of logistics optimisation and enhanced security at the same time.